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DE 100 33 345 A1 and DE 101 59 503 A1 disclose a

AMENDED SHEET

wirefree electrical connection between the electrical functional devices of a trailer and the control device of a tractive unit.

- 5 DE 195 32 043 C2 and EP 0 616 924 A1 describe a device for inductively transmitting signals and energy which can be used, for example, between the fixed steering column and the steering wheel of a vehicle.
- 10 US 6,222,433 B1 discloses a trailer hitch between a passenger car and a boat trailer. The two coupling parts which match one another are each provided with an induction coil whose axes are arranged parallel to the vertical direction. Both a carrier signal and a data
- 15 signal can be transmitted by means of this wirefree transmission of signals to the boat trailer.

The object of the present invention is to provide an alternative transmission arrangement for a semitrailer

20 train with a fifthwheel and a means of transmitting signals from the towing vehicle to the semitrailer in such a way that mechanical coupling of the electrical plug-type connector of the electrical lines can be dispensed with.

25 This object is achieved according to the invention by means of the features of claim 1. Accordingly, a fifthwheel which is assigned to the towing vehicle and a coupling part which is assigned to the semitrailer

30 are provided in order to form a mechanical connection between the towing vehicle and semitrailer, the coupling part which is assigned to the towing vehicle being a fifthwheel pickup plate and the coupling part which is assigned to the semitrailer being embodied as

35 a kingpin which matches said coupling part, a transformer coil being arranged in the fifthwheel pickup plate of the towing vehicle in order to transmit

the carrier signal with control data modulated onto it to a transformer coil in the region of the kingpin of the semitrailer, and the transformer coil in the fifthwheel pickup plate of the towing vehicle being a
5 coil whose linear or curved longitudinal axis is arranged essentially parallel to the plane of the fifthwheel pickup plate.

According to the invention, it has been recognized that
10 energy for supplying power to a component in the semitrailer can be transmitted in a wirefree fashion by means of inductive coupling via the two transformer coils arranged on the semitrailer train. As a result, by inductive coupling of the type which occurs in a
15 transformer coil, the supply current for the component in the semitrailer can be produced in the towing vehicle and transmitted to the semitrailer in a wirefree fashion. As a result, there is no need for a separate generator to be provided in the semitrailer in
20 order to operate individual control devices with direct current or lamps or compressors for brake systems with alternating current. Since the inductive coupling takes place in a wirefree fashion between the two transformer coils, the voltage generator in the towing vehicle must
25 generate a periodically fluctuating voltage since only alternating voltages can be input into the transformer coil on the semitrailer via the inductive coupling. The voltage generator in the towing vehicle can be used to generate a genuine alternating voltage with an
30 alternating voltage sign such as is ensured, for example, by a sinusoidal function, or the periodically fluctuating energy signal is generated by superimposing alternating voltage and direct current so that the voltage fluctuates between zero potential and a
35 positive potential. The transformer coil then induces a pure alternating voltage in the transformer coil on the semitrailer and, depending on the component which is to

be supplied in the semitrailer, this alternating voltage is then rectified or, for example, lamps can also be actuated by alternating voltage.

5 As a result of the particularly advantageous transmission of energy from the towing vehicle to the semitrailer, a separate generator in the semitrailer can be dispensed with and it is additionally also possible to dispense with a plug-type connector between
10 the towing vehicle and semitrailer since the energy is transmitted inductively between the towing vehicle and semitrailer.

In order to transmit the supply voltage from the towing
15 vehicle to the semitrailer it is necessary for the voltage generator in the towing vehicle to generate, for example, a sinusoidal carrier signal on which, if appropriate, a direct voltage can be superimposed in order to generate a periodically fluctuating direct
20 voltage signal. In the semitrailer it is then possible, if appropriate, to provide a rectifier which converts the power supply voltage which is transmitted by the transformer coil into direct current so that the component of the semitrailer can be supplied with
25 direct voltage.

The object is also achieved according to the invention by the features of the independent claim 2. Accordingly, a signal modulator which modulates the
30 control data onto the energy signal which functions as a carrier signal and transmits it to the first transformer coil in the region of the fifthwheel pickup plate of the towing vehicle is also provided in the towing vehicle. The carrier signal with the control
35 data modulated onto it is transmitted to a second transformer coil in the region of the kingpin of the semitrailer, a demodulator being provided in the

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semitrailer in order to separate the control data of the total signal transmitted by inductive coupling from an energy-carrying power supply voltage which is applied in order to supply power to a component on the power supply line of the semitrailer. In this context, in addition to transmitting the energy signal in the manner of a power line communication, the control data of the control device of the towing vehicle is modulated onto the carrier signal and transmitted in a wirefree fashion to the semitrailer. The demodulator then separates the control data again into the control data and the energy-carrying power supply voltage at the semitrailer side so that the total signal is used both to supply the component with current and to generate the control data for the components. This can be done without wirebound transmission from the towing vehicle to the semitrailer by inductive coupling between the two transformer coils. There is advantageously no need any longer for a plug-type connector to transfer the signals between the towing vehicle and trailer in a wirebound fashion.

In one development of the invention, the transformer coil in the fifthwheel pickup plate of the towing vehicle is a coil whose linear or curved longitudinal axis is arranged essentially parallel

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Patent claims

5 1. A semitrailer train comprising a towing vehicle
 (2) and a semitrailer (3), a control device (10)
 for controlling components (9) of the semitrailer
 (3) being provided in the towing vehicle (2) and
 the semitrailer (3) having data lines (17) for
 10 transmitting the control data and power supply
 lines (16) for supplying power to the components
 (9), a voltage generator for generating a
 periodically fluctuating carrier signal being
 provided in the towing vehicle (2), in that a
 15 signal modulator (12) modulates the control data
 onto the carrier signal, and a demodulator (15) in
 the semitrailer (3) separating the total signal
 which is transmitted by inductive coupling into a
 carrier signal and the control data, and the
 20 control data being provided for actuating a
 component (9) in the semitrailer (3),
 characterized in that a fifthwheel (4) which is
 assigned to the towing vehicle (2) and a coupling
 part (5) which is assigned to the semitrailer (3)
 25 are provided in order to form a mechanical
 connection between the towing vehicle (2) and
 semitrailer (3), the coupling part which is
 assigned to the towing vehicle (2) being a
 fifthwheel pickup plate (5) and the coupling part
 30 which is assigned to the semitrailer (3) being
 embodied as a kingpin (6) which matches said
 coupling part, in that a transformer coil (7) is
 arranged in the fifthwheel pickup plate (5) of the
 towing vehicle (2) in order to transmit the
 35 carrier signal with control data modulated onto it
 to a transformer coil (8) in the region of the
 kingpin (6) of the semitrailer (3), and in that

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the transformer coil (7) in the fifthwheel pickup plate (5) of the towing vehicle (2) is a coil whose linear or curved longitudinal axis is arranged essentially parallel to the plane of the fifthwheel pickup plate (5).

2. A semitrailer train comprising a towing vehicle (2) and a semitrailer (3), a control device (10) for controlling components (9) of the semitrailer (3) being provided in the towing vehicle (2), and the semitrailer (3) having data lines (17) for transmitting the control data and power supply lines (16) for supplying power to the components (9), a voltage generator for generating a periodically fluctuating carrier signal being provided in the towing vehicle (2), and the carrier signal which is transmitted by inductive coupling being provided as a power supply voltage for a component (9) in the semitrailer (3), characterized in that a fifthwheel (4) which is assigned to the towing vehicle (2) and a coupling part (5) which is assigned to the semitrailer (3) are provided in order to form a mechanical connection between the towing vehicle (2) and semitrailer (3), the coupling part which is assigned to the towing vehicle (2) being a fifthwheel pickup plate (5) and the coupling part which is assigned to the semitrailer (3) being embodied as a kingpin (6) which matches said coupling part, in that a transformer coil (7) is arranged in the fifthwheel pickup plate (5) of the towing vehicle (2) in order to transmit the carrier signal to a transformer coil (8) in the region of the kingpin (6) of the semitrailer (3), and in that the transformer coil (7) in the fifthwheel pickup plate (5) of the towing vehicle (2) is a coil whose linear or curved longitudinal

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axis is arranged essentially parallel to the plane of the fifthwheel pickup plate (5).

3. The semitrailer train as claimed in claim 1 or 2,
5 characterized in that the semitrailer (3) has a rectifier which converts the transmitted carrier voltage into direct current so that the components (9) of the semitrailer (3) can be supplied with direct voltage.
- 10 4. The semitrailer train as claimed in claim 1 to 4, characterized in that the transformer coil (8) in the region of or inside the kingpin (6) of the semitrailer (3) is a further coil whose linear or
15 curved longitudinal axis is arranged essentially parallel to the plane of the fifthwheel pickup plate (5) when the semitrailer train (1) is coupled.
- 20 5. A towing vehicle having a fifthwheel (4) which has a fifthwheel pickup plate (5) for forming a mechanical connection between the towing vehicle (2) and semitrailer (3), a control device (10) for
25 controlling components (9) of the semitrailer (3) being provided in the towing vehicle (2), and data lines (11) being provided for transmitting the control data to the semitrailer (3), and power
30 supply lines (14) being provided for supplying power to the components (9) of the semitrailer (3), characterized in that an alternating voltage generator for generating a carrier signal is provided in the towing vehicle (2), in that a
35 signal modulator modulates the control data onto the carrier signal, and in that a transformer coil (7) is arranged in the fifthwheel pickup plate (5) of the towing vehicle in order to transmit the carrier signal with the control data modulated

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5 onto it to a transformer coil (8) in the region of
a kingpin (6) of a semitrailer (3) in order to
generate in the semitrailer (3) a carrier signal
and control data for a component (9) in the
semitrailer (3) from the signal which is
transmitted by inductive coupling, in that the
transformer coil (7) in the fifthwheel pickup
plate (5) of the towing vehicle (2) has a coil
whose linear or curved longitudinal axis is
10 arranged essentially parallel to the plane of the
fifthwheel pickup plate (5).

6. A semitrailer for a semitrailer train (1) having a
kingpin (6) which is suitable for coupling to a
15 coupling part of a towing vehicle (2), it being
possible to actuate components of the semitrailer
(3) by means of a control device (10) of the
towing vehicle (2), and the semitrailer (3) having
data lines (17) for transmitting the control data,
20 and power supply lines (16) for supplying power to
the components (9), characterized in that a
demodulator (15) which separates the total signal
transmitted from the towing vehicle (2) by
inductive coupling into an energy-carrying power
25 supply voltage and the control data is provided in
the semitrailer (3), the power supply voltage
being provided to supply power to a component (9)
in the semitrailer (3), in that the transformer
coil (8) in the region of or inside the kingpin
30 (6) of the semitrailer (3) is a further coil whose
linear or curved longitudinal axis is arranged
essentially parallel to the plane of the
fifthwheel pickup plate (5) when the semitrailer
train (1) is coupled.